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*Science of The Total Environment*

**Editor-in-Chief**

Dear Editor-in-Chief, 8th May 2024

I hope that the following research article will be considered for publication in *Science of The Total Environment*:

**Discriminating Seagrasses From Green Macroalgae in European Intertidal areas using High Resolution Multispectral Drone Imagery.**

Intertidal seagrass meadows provide a wide range of ecosystem services to humanity. They are particularly vulnerable to the intensification of human activities in coastal areas, facing direct impacts from anthropogenic pressures. This has led to a worldwide decline and fragmentation of these critical habitats, which, in turn, can significantly undermine the ecosystem services that seagrass meadows provide. The critical role of seagrass meadows and the diverse ecosystem services they offer have spurred the development of enhanced global and regional initiatives to monitor Essential Oceanic Variables (EOVs) such as seagrass composition, and Essential Biodiversity Variables (EBVs) including taxonomic diversity, species distribution, population abundance, and phenology of seagrasses. Traditionally, seagrass status indicators have been determined through in situ measurements, yet obtaining these measurements in intertidal zones is notoriously difficult. Remote sensing techniques have proven effective in complementing in situ sampling, allowing for the near real-time and consistent retrieval of seagrass EOVs and EBVs over extensive meadows. However, this technique faces limitations in accurately mapping vegetation when taxonomically distinct species have identical pigment compositions and frequently.

This study addresses critical gaps in the remote sensing of coastal ecosystems, particularly in accurately mapping seagrass and green macroalgae in heterogeneous intertidal zones — two classes that are traditionally difficult to unravel using satellite remote sensing techniques due to their limited spatial and spectral resolution. Our research utilizes high-spatial resolution imagery from unmanned aerial vehicles (UAVs) equipped with a multispectral sensor, mirroring those of the Sentinel-2 satellites. Nine drone flights across diverse intertidal habitats in France and Portugal were conducted to demonstrate the precision of our deep learning classifier, which achieved an overall accuracy of 94% in discriminating between five taxonomic classes of intertidal vegetation with a large validation dataset. Our findings underscore the capability of multispectral remote sensing combined with a machine-learning techniques to accurately differentiate between types of vegetation that share similar pigment compositions.

For consideration of this manuscript, we would suggest the following reviewers:

* Antoine Collin for their expertise on drone remote sensing applied to coastal environments. Email: antoine.collin@ephe.psl.eu
* Dimitris Poursanidis for their knowledge of using remote sensing for seagrass meadows. Email: dpoursanidis@gmail.com
* Martin Gade for their knowledge of soft bottom habitat classification using remote sensing. Email: martin.gade@uni-hamburg.de

If we can be of assistance for further referee suggestions, please do not hesitate to contact me.

The first author Simon Oiry is also the corresponding author, and the work described, the production and authorship conform in every respect to Nantes University’s policies on ethical and responsible behaviour in research. We confirm that this manuscript has not been published elsewhere and is not under consideration by another journal. All authors have approved the manuscript and agree with its submission to *Science of The Total Environment*.

We look forward to hearing from you in due course.

Yours sincerely,

Simon Oiry

On behalf of all co-authors